pivoting lever acts on the lower face of the printing media **1** which, after passing over the main cylinder **5**, will be disposed on the paper separator **11** so that the lower face of the printing media, with reference to the position of the said printing media at the input to the printer, will have become the upper face at the output of the printer, so that the printing will have taken place precisely on the said face, showing any marks which may have been produced by the end of the lever.

Moreover, in the known structure shown in FIG. **1**, the guide unit **8** and the structure **9** together obstruct the view of the upper end **12** of the printing media supplied to the printer, especially when the said printing media is in the vicinity of the gripping region between the rollers **4** and **5**, that is, upon reaching the end of the initial, manual-feed period.

In the arrangement shown in FIG. **2**, the front structure **8** and **9** which covers the entire width of the printer has been replaced by a series of deflecting elements **13** of limited width which therefore enable the location of the printing media **15** to be seen up to the region **14**. In this version, the printing-media detector is disposed in the region **16** corresponding to the lower portion of the deflecting element **13**, thus enabling the lever which is acted on by the edge **17** or the printing media **15** to act downwards from above, thus acting on the opposite face to the printing face, that is, in the opposite manner to that which occurs in the previously known arrangement shown in FIG. **1**. Any possible stains on the printed face of the printing media are thus prevented.

In accordance with the present invention, the printing-media detector is made up as can be seen in greater detail in the embodiment shown in FIGS. **3** to **10**.

In accordance with the present invention, a pivoting element **18** is formed, which preferably has a flattened structure and opposite edges, and which also has two rotation pivots **19** and **20** separated by a certain distance, the said pivoting element **18** being completed by two extensions, a lower extension **21** for receiving the edge of the printing media, and another, lateral extension **22** for introduction into the support **23** carrying the conventional means for generating and receiving the light beam which, upon interruption by the said extension **22**, generates the desired control signal relating to the presence or absence of the printing media. As shown schematically in FIG. **11**, the support **23** has an internal slit **24** which is penetrated by the extension **22**, and which has, on its faces, the conventional elements indicated schematically by the numerals **25** and **26**, for generating and receiving a light beam which may be interrupted by the extension. **22**.

The pivots **19** and **20** of the element **18** slide in respective grooves **27** and **28** shaped as arcs of circles, each of which has its centre of rotation at the lower end of the other groove, defining respective upper and lower limit stops for the rotation pivots. As will be appreciated from FIG. **3**, the arcuate groove **28** has its centre of rotation at the lower end of the groove **27** at which the pivot **19** is disposed in the rest position and, conversely, the groove **27** along which the pivot **19** moves has its centre at the lower end of the groove **28** at which the pivot **20** is disposed in the rest position.

By virtue of this arrangement when the printing media **29** in the form of continuous paper, a sheet of paper or the like is introduced it slides over the platen **30**, its front edge falling on one of the side edges of the extension **21**, which acts as a pivoting lever so that the pivoting element **18** as a whole rotates in accordance with the arrow **31** indicated in FIG. **5**, the extension **22** coming out of the support **23** and the printing media **29** sliding towards the feed roller of the printer. As can be seen in FIG. **5**, the pivot **19** has slid inside the groove **27** rising along it, whilst the pivot **20** has remained in its rest position bearing on the lowest portion of the groove **28**. Once the whole of the laminar substrate **29** has passed under the pivoting element **18**, the latter returns to its rest position as shown in FIG. **6**, owing to the effect of gravity, pivoting on the pivot **20**, and rotating in accordance with the arrow **32**. In this position, the extension **22** has been introduced into the support **23** again, interrupting the beam once more.

According to one of the characteristics of the present invention, and as has been established by the inventors, given the structure of the pivoting element **18** combined with the two grooves shaped as arcs of circles, during the return movement of the pivoting element back to the rest position, the element is well centered between the two supports which act as stops during the vertical movement of the pivoting element **18** so that, in combination with the considerably lower position of the centre of gravity of the said element **18** in comparison with the pivot points, a positioning of the pivoting lever to its rest position is brought about without appreciable oscillation thereof, preventing the oscillation effect of the levers of the currently-known optical detectors.

FIGS. **7** to **10** show the various movements of the pivoting element according to the modality of use of the printer. Thus, for example, in FIG. **7**, it can be seen that the printing media **29**, which is moving rearwardly, as indicated by the arrow **33**, returns to lift the pivoting element **18**, the extension **22** coming out of the support **23** again until it reaches the position shown in FIG. **8**, the pivoting element **18** rotating anticlockwise in accordance with the arrow **34**. The laminar substrate **29** is shown moving forwards again in FIG. **9**, in which the opposite movement of the paper, indicated by the arrow **35**, can be seen, the pivoting element **18** remaining in the same raised position as in FIG. **8**, having rotated on the pivot **19** which is situated in the lower position, and the pivot **20** having moved along the groove **28**. When, in its upward movement in accordance with the arrow **35**, the lower edge of the printing media **29** has passed beyond the rest position of the pivoting element **18**, the said pivoting element **18** returns to its rest position as shown in FIG. **10**, operating in the same manner as explained above so that any oscillations in the pivoting lever are prevented.

Owing to the specific construction of the detector of the present invention, as indicated, a very marked self-stabilizing effect is achieved, preventing oscillations of its operating lever when the element returns to its rest position. Moreover, the advantage is achieved, that the action of the lever takes place on the opposite face of the printing media to the printing face and the sensor as a whole has greatly reduced friction and bi-directional operation, that is, the detector is active for both directions of movement of the printing media.

Although the invention has been described with reference to the embodiment shown in the above-mentioned drawings, it will be understood that it is not limited to this embodiment but, on the contrary, may adopt many variations which will be clear to experts in the art and are included within the scope of the following claims.

What is claimed is:

1. An optical device for detecting an edge of a medium in hard copy devices, comprising an extension which engages the medium and oscillates simultaneously on two pivots, each of which engages a respective guiding groove.

2. An optical device as claimed in claim **1**, which comprises an optical sensor and a pivoting element pivoting on

the two rotation pivots which are incorporated therein a certain distance apart, wherein said guiding grooves are shaped as independent and curved, said pivoting element comprising said first extension of the optical device and a second extension; the first extension engaging, at its front and rear edges, the edges of the medium during forward and rearward movements of the medium; the second extension moving into and out of an opening of the optical sensor in a manner corresponding to the rotary movements of the pivoting element brought about by the movements of the medium.

3. An optical device as claimed in claim **1**, wherein the first extension has a flattened structure defining opposite edges.

4. An optical device as claimed in claim **2**, wherein the centroid of the pivoting element: is disposed below the line joining its two rotation pivots, bringing about a self-centring effect of the rotation pivots on the lower ends of the respective grooves.

5. An optical device as claimed in claim **1** wherein the grooves are shaped as arcs of circles and disposed in opposition to one another, each of them defining an upper and a lower travel limit for their respective rotation pivot.

6. An optical device as claimed in claim **5**, wherein the geometrical centre of each of the grooves is disposed at the lower end of the opposite groove.

7. A hard copy device comprising an input guide for media and an optical device for detecting an edge of a medium arranged above the input guide, whereby a first extension of the optical device contacts the medium, extends downward towards said input guide and oscillates simultaneously on two pivots.

8. The hard copy device as claimed in claim **7**, which further comprises a front element for deflecting the media when it is output from the hard copy device, wherein such front element incorporates said optical device.

9. The hard copy device as claimed in claim **7**, wherein the first extension of the optical device engages the medium on the face which is opposed to the one intended to receive the printing.

10. The hard copy device as claimed in claim **7**, wherein each of said two pivots engages a respective guiding groove.

11. The hard copy device as claimed in claim **7**, wherein the optical device comprises an optical sensor and a pivoting element pivoting on the two rotation pivots which are incorporated therein a certain distance apart, wherein said guiding grooves are shaped as independent and curved, said pivoting element comprising said first extension of the optical device and a second extension; the first extension engaging, at its front and rear edges, the edges of the medium during forward and rearward movements of the medium; the second extension moving into and out of an opening of the optical sensor in a manner corresponding to the rotary movements of the pivoting element brought about by the movements of the medium.

12. The hard copy device as claimed in claim **7**, wherein the first extension has a flattened structure defining opposite edges.

13. The hard copy device as claimed in claim **11**, wherein the centroid of the pivoting element is disposed below the line joining its two rotation pivots, bringing about a self-centring effect of the rotation pivots on the lower ends of the respective grooves.

14. The hard copy device as claimed in claim **10**, wherein the grooves are shaped as arcs of circles and disposed in opposition to one another, each of them defining an upper and a lower travel limit for their respective rotation pivot.

15. The hard copy device as claimed in claim **10**, wherein the geometrical centre of each of the grooves is disposed at the lower end of the opposite groove.

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